

framing a sentence is such as, at times, to convey to his readers a meaning totally different from the one he intended, and also that he is not always acquainted with the signification of the terms he employs. As an example of the former kind of error we may refer our readers to p. 17, where it is stated that antelopes and snow-leopards are "denizens of the deep"; while as a sample of the second we may adduce the misapplication of the term "antlers" to the cranial appendages of sheep (p. 26).

Admitting that Mr. Westell displays a strong love of nature, the best we can say of the text in general is that, for the most part, it consists of descriptions of what may be seen during a country walk at different seasons of the year, interspersed with platitudes and reflections, and extracts from poems. We have, however, failed to detect anything strikingly original either in the proper subject of the book or in the articles devoted to the discussion of the beaks, tails and feet of birds. The article on the Rothschild museum and menagerie seems chiefly intended to display the author's profound ignorance of natural history in general.

The one redeeming feature of the book is to be found in the illustrations, which are exquisite examples of photogravure; and if it consisted of these alone (which, by the way, have been photographed by friends of the author), it would certainly form a pretty picture-book for the drawing-room table. But, as the author is once again candid enough to admit, the illustrations, for the most part, have no sort of connection with the text, and are, so to speak, thrown in at haphazard.

A few of the articles, it seems, have previously appeared in magazines; while the majority or all of the rest were first published in the columns of certain local newspapers circulating in the home counties. In our own opinion, the author would have been better advised had he been content with the credit to be derived from such ephemeral publication.

R. L.

The Geology of Sydney and the Blue Mountains: a Popular Introduction to the Study of Geology. By the Rev. J. Milne Curran. Second edition. Pp. 391. (Sydney: Angus and Robertson, 1899. London: Australian Book Co., 38, West Smithfield.)

THIS is, strictly speaking, an elementary manual of geology, written and illustrated with especial reference to the geology of Sydney. The general plan of the work is good; the book is well printed and illustrated with maps, photographic pictures of rock structure and scenery, figures of fossils and rock sections; and it is satisfactory to learn that the labours of the author have been appreciated, as the first edition, published in 1898, was sold out in a few months. This speaks well for the interest taken in the study of geology in New South Wales. The colony is fortunate in having representatives of all the great geological systems from the Silurian upwards, but it is sufficient for the Australian student to learn the forms of life which characterise these main divisions all the world over, while he supplements the knowledge with particulars of the strata and organic remains in his own country. To him information about the Hawkesbury-Wianamatta series or the Mount Lambie sandstones is more important than a description of the Wenlock Limestone, the Lower Greensand or the London Clay.

The author gives general accounts of fossils, minerals, and rocks, but he sometimes becomes too popular in style, as, for instance, when he remarks of the Labyrinthodon, that "This ungainly creature was a shovel-headed Salamander, which pattered about like Falstaff in his old age, 'with much belly and little legs.'" To be very popular and also exact is difficult, and in this respect the author is not wholly successful.

Information is tabulated and repeated almost to excess; there is a table of the stratified rocks of New

South Wales, another of the principal Australian sedimentary formations, and a third of the general succession of Australasian strata, to say nothing of minor tables. The characteristic fossils of the Australian formations are enumerated (pp. 84, 85), but in so erratic a fashion that saurians, fishes, echinoderms and mollusca are hopelessly mixed.

The author observes in his preface (p. 8) that "some friendly critics have found fault with the disposition of the illustrations." These critics were quite right. There is no excuse for placing a figure of the Triassic *Trematodus* in a page dealing with Pleistocene, nor a figure of remarkable weathering of sandstone in a page treating of basalt!

The sketch map which serves as frontispiece has no scale attached to it, while the coloured geological map of Mount Victoria, Blackheath and Hartley takes in a part of the Blue Mountains, though the fact is not made manifest. It is desirable that references be given in all cases where quotations on scientific subjects are made, and it would be well to add the initials of authors in the list of works given in the appendix.

The author concludes his work with a glossary. We doubt the utility of giving the derivations of many biological names; some of these appear ludicrous, as, for instance, *Agnostus* (I know not), *Athyris* (without a door), *Avicula* (a little bird), *Phanerogams* (visible marriage), &c. These, however, are trifling matters. The book is one on which further pains may advantageously be bestowed, as it is sure soon to reach a third edition.

Light Railways at Home and Abroad. By W. H. Cole, M.I.C.E. Pp. x + 339. (London: C. Griffin and Co., Ltd., 1899.)

WHILE it is too soon to say that the Light Railways Act of 1896 has in any degree failed in its object, it must be admitted that as yet there are no signs of that revolution in the transport service of country districts for which the more enthusiastic promoters of the Act had hoped. Of the many schemes that have been brought forward but few have emerged from the successive ordeals of the Light Railway Commissioners and the Board of Trade, and of these several have failed to secure the necessary support of capital. This is hardly to be wondered at, for the districts in which the need of improved facilities for transport is most urgent are precisely those in which the spirit of enterprise and the power of raising capital are weakest. The British agriculturist, too, whether landlord or tenant, has been so long unaccustomed to take joint action for a common end, that many hopeful schemes have failed to obtain the support of those who might be expected to reap the chief benefit from them. It may be that the provisions of the Act require modification, that the Board of Trade must become less exacting in its conditions, that greater encouragement must be given to local authorities, or easier access afforded to Treasury grants. These are questions which a few years working of the Act will answer.

Meantime, to all who are interested in the subject of light railways, whether as promoter, engineer, or possible user, Mr. Cole's book is indispensable. His object has been to collect all available information from many scattered sources, and to condense and present it in compact and accessible form, and he has succeeded in producing a very useful book of reference. Something more than a hundred pages are devoted to light railways abroad, special attention being given to their development in Belgium, France, Italy and India. In each case full details are given as to the provision of capital, whether by the State, by local authorities or by private enterprise; as to gauge, weight of rolling stock, use of highways and other details of construction; as to various economies of working, limits of speed and precautions

for safety; and, lastly, as to the financial return and the disposal of profits when such exist.

The second portion of the book is more directly concerned with light railway development in England. A useful chapter is concerned with an analysis of the Act of 1896, while the special chapters on "The Question of Gauge" and on "The Construction and Working of Light Railways" are perhaps the most valuable in the book. On the question of gauge it may be worth while to quote Mr. Cole's conclusion, which is that for railways making connection with main lines the standard gauge is imperative, and that for smaller independent lines the reduced gauge of thirty inches may be used. In this connection we notice no reference to the Duke of Westminster's narrow-gauge railway at Eaton Hall, though this is, perhaps, the most instructive example of a small and self-contained railway in the United Kingdom.

The book contains a number of folding plates, showing details of construction both of permanent way and of rolling stock; and a long appendix includes tables of returns for many railways, both of standard and of light construction, as well as the full text of the Act of 1896 and its schedules.

Les Plaques sensibles au Champ électrostatique. Par V. Schaffers, S.J. Pp. xxxix + 19. (Paris: A. Hermann, Librairie Scientifique, 1900.)

THE phenomena treated of in this pamphlet are those observed when an electric discharge from a powerful Whimshurst was passed over the film of a photographic plate between two metallic points which usually were both in contact with the film. A great variety of films, containing various metallic salts mixed with different emulsions, &c., besides those ordinarily used for photographic purposes, were tried.

The potential difference used was not enough to spark across between the poles, and the changes produced in the films are probably mainly due to the current through the film, and not to the discharges through the air above it. In some cases the marks produced on the plate were approximately parallel to the lines of electrostatic force or current stream lines through the film, and several plates are given showing the effects obtained in such cases. A considerable variety of peculiar and more or less interesting appearances are clearly described, and possible explanations of them discussed. Scarcely any variations in the method of submitting the material to the action of the discharge were tried, and the object of the experimenter seems to have been more to obtain a large variety of peculiar appearances than to really elucidate the nature of the actions taking place. The method of obtaining pictures of the lines of force or current stream lines between conductors on the plates is described in detail, and such pictures as the author points out may be useful for educational purposes in some cases.

H. A. W.

The Elements of Plane Trigonometry. By Prof. W. P. Durfee. Pp. vi + 105. (Boston, U.S.A.: Ginn & Co., 1900.)

THERE are a few novel points in this book. Logarithms and their use in computations are dealt with in the first chapter, and most of the exercises are of a character which will lead the student to see that trigonometry has a practical value. The second chapter deals with trigonometrical ratios, and is followed by chapters on unlimited angles, reduction formulæ, the addition theorem, relations between the sides of a triangle and the trigonometrical functions of its angles, and solution of triangles. Logarithms are used in all the calculations. The course of work in the book is suitable for elementary studies of trigonometry, and constitutes an introduction to the theory of functions as illustrated by trigonometrical ratios.

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LETTERS TO THE EDITOR.

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Autotomic Curves.

MR. RICHMOND'S letter appears to be written under a misapprehension. My objection to such phrases as "non-singular cubic curve," "non-singular curve of the n th order," arises from the fact that a point of inflexion is just as much a singularity as a node, and that it is therefore inaccurate and misleading to describe such curves as non-singular. In fact, the only non-singular curves which exist are conic sections; all others are singular. On the other hand, the word autotomic exactly expresses the idea it is desired to convey; and I have been informed by several excellent Greek scholars that they do not consider the phrase "an anautotomic curve" open to objection, and that the alliteration may be frequently avoided by the use of the words every or any instead of an.

The terms *sesecting* and *non-sesecting* appear to be unobjectionable from a literary point of view; but with regard to *un-autotomic* and *nodeless* there is a general consensus of opinion amongst writers who are careful about their style against the use of hybrid terms composed of words belonging to two different languages.

A. B. BASSET.

Fledborough Hall, Ilolyport, Berks, November 16.

A Remarkable Dolphin.

DR. WAY, the headmaster of Rossall School, has recently forwarded to the Natural History Museum (for determination) portions of a cetacean stranded at Rossall in September. These portions include the skull, the imperfect flippers, the tail (including the caudal vertebrae), and the back-fin.

The skull and other bones leave no doubt that the animal is the bottle-nosed dolphin (*Tursiops tursio*). In place, however, of the ordinary "flukes" of a dolphin, the tail terminates in two long, narrow lobes, of which one is very much longer than the other; and, were it not placed in a horizontal instead of a vertical plane, it might well be mistaken for the tail of a thresher shark. The larger lobe of the tail measures 5 feet 3 inches, while the total length of the remainder of the creature was 10 feet. A similar abnormal elongation is noticeable in the case of the back-fin, which is about twice as long as ordinary, and proportionately slender. Externally, both the tail and the back-fin are thickly coated with small sea-weeds and sertularians.

Judging from the teeth, the animal appears to be very aged, and the only conjecture I can make in regard to the tail and back-fin is that their abnormal form is due to pathological hypertrophy, perhaps induced by an injury. I should be glad to hear of any other instances of analogous malformation among cetaceans.

R. LYDEKKER.

British Museum (Natural History), Nov. 19.

The Optics of Acuteness of Sight.

OBSERVATIONS have been frequently made upon the remarkable eyesight of certain uncivilised tribes. Travellers have told us of guides who could see four of Jupiter's satellites with the unaided eye; and lately Sir Redvers Buller has declared that the average Boer can see at least two miles further than the British soldier. It is of some interest to consider whether this superiority is due to a real change in the optical properties of the eye, or merely to some special ability to interpret slight differences of impression, which might be acquired by practice. As we have as yet no data as to the constants of a Boer's eye, we may raise the question whether such feats are optically impossible for an Englishman's eye.

The minimum visual angle is determined by the transverse diameter (c) of a foveal retinal cone, and its distance ($F'K''$) from the second nodal point of the eye. We have—

$$\tan \frac{\alpha}{2} = \frac{\frac{1}{2}c}{F'K''}$$

and, where $c = .002$ mm., $F'K'' = 15.498$ mm.

$$\alpha = 26.618''$$

In order that two points may be distinguished as such by the